

GP-302217

## CLAIMS

What is claimed is:

1. A catalyst composition comprising:
  - a first catalyst including a 10-70 wt% Pt or Pt alloy formed on carbon particles having a BET surface area of about 250 m<sup>2</sup>/g; and
  - a second catalyst including a 10-70 wt% Pt or Pt alloy formed on carbon particles having a BET surface area in the range of 600-1000 m<sup>2</sup>/g.
2. The catalyst composition according to claim 1 wherein the catalyst composition is a 1:1 ratio of the first catalyst and the second catalyst.
3. The catalyst composition according to claim 1 wherein the first catalyst includes about a 50 wt% Pt or Pt alloy.
4. The catalyst composition according to claim 1 wherein the second catalyst includes about a 50 wt% Pt or Pt alloy.
5. The catalyst composition according to claim 1 wherein the second catalyst has a surface area of about 800 m<sup>2</sup>/g.
6. The catalyst composition according to claim 1 wherein the carbon particles in the first and second catalysts comprise at least one of Acetylene Black, Black Pearls, Ketjen Black, Vulcan and combinations of Acetylene Black, Black Pearls, Ketjen Black and Vulcan.
7. The catalyst composition according to claim 1 wherein the Pt alloy comprises at least one of PtRu, PtCo, PtFe, PtMi, PtSn, PtTi and Pt alloys having any suitable transition metal or other non-noble metal catalysts.

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8. The catalyst composition according to claim 1 wherein the catalyst composition includes a catalyst loading less than 0.4 mg/cm<sup>2</sup>.

9. The catalyst composition according to claim 1 wherein the catalyst composition is part of one or both of an anode and a cathode in a membrane electrode assembly.

10. The catalyst composition according to claim 9 wherein the membrane electrode assembly is part of a proton exchange membrane fuel cell.

11. A catalyst composition comprising a mixture of a first catalyst and a second catalyst, said first catalyst including about a 50 wt % Pt formed on Vulcan XC72 carbon particles having a BET surface area of about 250 m<sup>2</sup>/g, and said second catalyst including about a 50 wt % Pt formed on Ketjen Black carbon particles having a BET surface area of about 800 m<sup>2</sup>/g.

12. The catalyst composition according to claim 11 wherein the mixture is a 1:1 mixture of the first catalyst and the second catalyst.

13. The catalyst composition according to claim 11 wherein the catalyst composition includes a catalyst loading less than 0.4 mg/cm<sup>2</sup>.

14. The catalyst composition according to claim 11 wherein the catalyst composition is part of one or both of an anode and a cathode in a membrane electrode assembly.

15. The catalyst composition according to claim 14 wherein the membrane electrode assembly is part of a proton exchange membrane fuel cell.

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16. A membrane electrode assembly (MEA) for a proton exchange membrane fuel cell, said assembly comprising:

an electrolyte membrane;

an anode positioned on one side of the membrane; and

a cathode positioned on an opposite side of the membrane from the anode, said cathode including a cathode catalyst layer, said cathode catalyst layer including a catalyst composition made of a mixture of a first catalyst and a second catalyst, said first catalyst including a 10-70 wt% Pt or a Pt alloy formed on carbon particles having a BET surface area of about 250 m<sup>2</sup>/g, and said second catalyst including a 10-70 wt% Pt or a Pt alloy formed on carbon particles having a BET surface area in the range of 600-120 m<sup>2</sup>/g.

17. The MEA according to claim 16 wherein the catalyst composition is a 1:1 ratio of the first catalyst and the second catalyst.

18. The MEA according to claim 16 wherein the first catalyst has about a 50 wt% Pt or Pt alloy.

19. The MEA according to claim 16 wherein the second catalyst includes about a 50 wt% Pt or Pt alloy.

20. The MEA according to claim 16 wherein the second catalyst has a BET surface area of about 800 m<sup>2</sup>/g.

21. The MEA according to claim 16 wherein the carbon particles in the first and second catalysts comprise at least one of Acetylene Black, Black Pearls, Ketjen Black, Vulcan and combinations of Acetylene Black, Black Pearls, Ketjen Black and Vulcan.

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22. The MEA according to claim 16 wherein the Pt alloy comprises at least one of PtRu, PtCo, PtFe, PtMi, PtSn, PtTi and Pt alloys having any suitable transition metal or other non-noble metal catalysts.

23. The MEA according to claim 16 wherein the catalyst composition includes a catalyst loading less than 0.4 mg/cm<sup>2</sup>.

24. A method of making a catalyst composition, comprising:

providing a first catalyst including a 10-70 wt% Pt or a Pt alloy formed on carbon particles have a BET surface area of about 250 m<sup>2</sup>/g;

providing a second catalyst including a 10-70 wt% Pt or a Pt alloy formed on carbon particles having a BET surface area in the range of 600-1200 m<sup>2</sup>/g; and

mixing the first catalyst and the second catalyst to form the composition.

25. The method according to claim 24 wherein mixing the first catalyst and the second catalyst includes mixing the first catalyst and the second catalyst in a 1:1 ratio.

26. The method according to claim 24 wherein providing the first catalyst includes providing the first catalyst having about a 50 wt% Pt or Pt alloy formed on Vulcan XC72 carbon particles.

27. The method according to claim 24 wherein providing the second catalyst includes providing the second catalyst having about a 50 wt% Pt or Pt alloy formed on Ketjen Black carbon particles having a BET surface area of about 800 m<sup>2</sup>/g.